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Pre-trial questionnaire on the Evironmental Control System of the Harvard II aircraft

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Abstract

In support of DRDC Protocol I-453 to investigate reported problems related to the Harvard II Environmental Control System (ECS), a pre-trial questionnaire was conducted using aircrew from 15 Wing located at CFB Moose Jaw. Three questions related to the ECS were asked to 12 aircrew. The results shows that the majority of aircrew interviewed believe that the heating system (75%) and defrost systems (67%) are deficient during winter flights and that the cooling system is deficient during summer flights (58%). Those results support previous observations made by 15 Wing and provide further evidence that a more objective and scientific approach is required to investigate the ECS perceived problems of the Harvard II aircraft.

Résumé

En appui au Protocol I-453 de RDDC visant à étudier les problèmes signalés concernant le système de conditionnement d'air du Harvard II, on a fait subir un questionnaire pré-essai à un équipage d'aéronef du 15 ERE, situé à la BFC Moose Jaw. Trois questions liées au système de conditionnement d'air ont été posées à 12 équipages d'aéronef. Les résultats montrent que la majorité des équipages interviewés croient que le circuit de chauffage (75 %) et le circuit de dégivrage (67 %) sont déficients pendant les vols hivernaux et que le circuit de refroidissement est déficient pendant les vols estivaux (58 %). Ces résultats corroborent les observations faites antérieurement par le 15 ERE et prouvent davantage qu'il est nécessaire d'adopter une approche plus objective et plus scientifique pour étudier à fond les problèmes apparents du système de conditionnement d'air de l'aéronef Harvard II.

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Executive summary

Deficiencies on the Environmental Control System (ECS) of the Harvard II aircraft were reported by 15 Wing at the CFB Moose Jaw. To further support those claims, a questionnaire was provided to students and instructor aircrew from 15 Wing. The results shows that the majority of aircrew interviewed believe that the heating system (75%) and defrost systems (67%) are deficient during winter flights and that the cooling system is deficient during summer flights (58%). Those results support previous observations made by 15 Wing and provide further evidence that a more objective and scientific approach is required to investigate the ECS perceived problems of the Harvard II aircraft.

Sommaire

Des déficiences du système de conditionnement d'air du Harvard II ont été signalées par le 15 ERE, situé à la BFC Moose Jaw. Afin d'appuyer ces faits, on a fait subir à des équipages d'aéronef, étudiants et instructeur, du 15 ERE un questionnaire. Les résultats montrent que la majorité des équipages interviewés croient que le circuit de chauffage (75 %) et le circuit de dégivrage (67 %) sont déficients pendant les vols hivernaux et que le circuit de refroidissement est déficient pendant les vols estivaux (58 %). Ces résultats corroborent les observations faites antérieurement par le 15 ERE et prouvent davantage qu'il est nécessaire d'adopter une approche plus objective et plus scientifique pour étudier les problèmes apparents du système de conditionnement d'air de l'aéronef Harvard II.

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Introduction

In support of a study planned under DRDC Toronto Protocol L-453 to investigate reported problems related to the Harvard II Environmental Control System (ECS), a pre-trial questionnaire was conducted during the winter 2004 using aircrew from 15 Wing located at CFB Moose Jaw.

The objective of the pre-trial questionnaire was to obtain further evidence and additional information from student and instructor aircrew from the 15 Wing about potential problems associated with the ECS of the Harvard II aircraft. Those results would substantiate previous comments received from the operational community indicating that the current ECS system may not meet the standards as described in the SOR (refer to SOR for a Phase II Aircraft for NFTC Appendix 6 to SOW 9177 and to document 39177-306-002/003 from D Air CFG 5-3-2). Furthermore, the results from the present pre-trial questionnaire will be used to identify the operational conditions when the problems are observed and will be used to improve protocol L-453.

Methods

Twelve aircrew from both genders volunteered to participate in the interview. The subjects were selected from 15 Wing located in Moose Jaw CFB. All selected aircrew were currently using the Harvard II aircraft for teaching/training purpose and were experienced with its equipment at the time of the interview.

The questionnaire consisted of three questions related to the general satisfaction with the ECS inside the Harvard II aircraft (see Annex A). The questionnaire was conducted on the 05 February 2004.

Results

The results from question 1 show that 75% of the subjects indicated a deficiency with the heating system during flight operations (Table 1). Table 2 presents the comments received from the subjects for question 1.

The results from question 2 show that 67% of the subjects indicated a deficiency with the defrost system during flight operations (Table 1). Table 3 presents the comments received from the subjects for questions 2.

The results from question 3 show that 58% of the subjects indicated a deficiency with the cooling system during flight operations (Table 1). Table 4 presents the comments received from the subjects for question 3.

Discussion

Based on the results obtained from the questionnaire, the majority of the aircrew interviewed believe that the heating system (75%) and defrost systems (67%) are deficient during winter flights and that the cooling system is deficient during summer flights (58%).

Based on the comments received from the subjects, the deficiency of the heating system seems to be limited to high altitude and long flight operations (e.g. across the country). The comments received for the defrost system show that the deficiency related to that system may be occurring mainly during high altitude flight operations at the back portion of the canopy. A number of aircrew believe that the problem may be related to improper defrost procedure due to noise and thermal comfort (aircrew feel too warm) during its operation. Based on the comments received, the deficiency of the heating system was noticed during both low and high flight operations.

Those results support previous observations made by 15 Wing and provide further evidence that a more objective and scientific approach should be used to investigate the ECS perceived problems of the Harvard II aircraft. Protocol L-453 was developed to fulfill this objective. A summer and winter trial are planned for FY 04/05 to be conducted with 15 Wing at the CFB Moose Jaw.

Table 1. Responses obtained from the subject aircrews to 3 questions (see Annex A) related to the ECS system of the Harvard II aircraft. N = 12

	ANSWERS		
QUESTION #	*Yes*	*No*	
	"there is deficiency"	*"there is no deficiency"*	*"Cannot comment"*
1 (HEATING)	9	2	1
2 (DEFROST)	8	4	0
3 (COOLING)	7	4	1

Table 2. *Comments received for question #1 on the deficiency of the heating system. The number in parenthesis is the number of subjects with the same comment.*

COMMENTS	
Yes	***No***
"there is deficiency"	***"there is no deficiency"***
Cold in high altitude (4)	Have to use the system properly
Cold in back seat (2)	
Cold on long mission (3)	

Table 3. Comments received for question #2 on the deficiency of the defrost system. The number in parenthesis is the number of subjects with the same comment.

COMMENTS	
Yes	***No***
"there is deficiency"	***"there is no deficiency"***
Can not keep up at high altitude	Have to use the system properly
Presence of frost at the back of canopy	But too hot if try to keep rear canopy clear
Slow response on very cold days (2)	Defrost on ground before departure
Need more flow? (2)	Question of technique
	Clear in 2 min
	But can not use defrost during landing and departure procedures

Table 4. *Comments received for question #3 on the deficiency of the cooling system. The number in parenthesis is the number of subjects with the same comment.*

COMMENTS	
Yes ***"there is deficiency"***	***No*** ***"there is no deficiency"***
Too hot (2)	Acceptable
Too much time for cooling at high altitude	But could be better
Problem at low altitude (2)	
Not comfortable	
Problem with vent position?	
Not enough cooling (Ta>25°C)	

Annexes

ANNEX A

Pre-trial Questionnaire for Harvard II aircrew on ECS

Tail number:_____

Based on your experience,

1- Would you say that the heating system of the Harvard II is deficient during winter flights?

Yes _____
No _____
If yes, why

_____
_____
_____

2- Would you say that the defrost system of the Harvard II is deficient during winter flights?

Yes _____
No _____
If yes, why

_____
_____
_____

3- Would you say that the cooling system of the Harvard II is deficient during summer flights?

Yes _____
No _____
If yes, why

_____
_____
_____

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